IN THE SPECIFICATION

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BRIEF DESCRIPTION OF THE DRAWINGS

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to ~~it's~~ its organization and manner of operation, together with further objects and advantages thereof, may best be understood with reference to the following description, taken in connection with the accompanying drawings in which:

FIGURE 5 is a graphic illustration of one of the wave ~~form~~ forms used to drive ~~the~~ gas discharge lamps and electroluminescent lighting ~~device~~ devices.

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Block 6 is the half bridge converter as shown in Figure 1. Line 17 connects point A of Figure ~~2~~ 1 to the control and drive module 24. Line 18 connects point B of Figure 1 to the control and drive module. The output of the half bridge 6 is on line 7 and connects, via DC blocking capacitor 9, to inductor 8. It also connects to control and drive module 24 via line 19. DC blocking capacitor 9 may be large enough that its value does not enter into the resonant calculation but acts simply to pass the AC with little or no impedance while totally blocking any DC component from flowing into the load or it may be included in the resonant calculation along with capacitor 10. Inductor 8 and capacitor 10 make up a series resonant circuit that converts the square wave output of the half bridge to a sine wave. This is applied to the output load in this case a gas discharge lighting device 15 by line 16 and through current sensing resistor 32 to line 11. Transformer 12 connected between line 16 and through current sensing resistor 72 to line 11, across the load, provides power for the lamp's heaters 91 and 92 from secondary windings 13 and 14 respectively.

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The microprocessor output is at pins 6 and 8. Pin 6 is connected directly by line 18 to the drive point B to turn on the bottom transistor in the half bridge. Output Pin 8 is connected by line 53 to high side driver to drive the top transistor at point A through line 17. Since this transistor is not referenced to the common bus, a high side driver must be employed. Power for the high side driver needed to drive the transistor is created by charging capacitor 56 through diode ~~53~~ 55 when the bottom transistor is on and the output of the bridge is low. This is often referred to as a boot strap power supply.

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Figure 5 depicts a method of driving the two transistors of Figure 1. In this method ~~rather than vary~~ in addition to varying the frequency to control the amount of output, the circuit is operated at resonance at all times and the output level is controlled by the amount of energy input to the resonant network. Figure 5 (A) depicts the drive to the bottom transistor 90 and Figure 5(B) depicts the drive to the top transistor 89. The circuit would also work if the drive to the two transistors were reversed but a large DC bias voltage accumulates on the capacitive element of the circuit so the first method is more often chosen. Vertical axis 110 represents the magnitude of the drive voltage and the horizontal axis 11 represents time.

At full output, or if adjusting frequency is used to control output level, the bridge inverter of Figure 1 is driven with a 50/50 duty cycle as shown in the alternating drive pulses 113 and ~~114~~ 112. Although 50/50 is shown there is always some dead time between turning off the drive of one switch before turning on the drive of the other switch to allow for switching time. When the drive is operated at a frequency at or above resonance, to lower power to the load, some current will continue to flow into the resonate network ~~when the switch is first turned off.~~ during the switch transition between off and on. When FETs are employed there is an inherent diode within the FET with its anode at the source and its cathode at the drain. When bipolar transistors are used equivalent diodes may be added across each transistor or the base collector junction

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may be used to supply this current. When it is desirable to reduce the amount of energy to the load, while keeping the frequency constant, or to supply additional control other than varying frequency, the turn on time of the top transistor 88 is shortened and the turn on time of the bottom transistor 90 is increased proportionately. Except for some cross over dead time at switching least one transistor is at all times maintaining a low impedance drive to the load. The frequency may also be held constant by reducing the length of both drive pulses with a large amount of off time in between each pulse. This presents a high impedance drive to the resonant network and does not always provide satisfactory operation. A reduction in energy delivered where the on time of the top switch is reduced as shown by drive pulse 115 while the bottom switch on time is extended. Further reduction in power output is depicted with short drive pulse 117 and corresponding long drive pulse 116. Although this method of drive is required for driving electro luminescent flat panels it may also be used to drive gas discharge lighting devices.